Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Wireless Telecommunications Bureau Seeks to Supplement the Record on the 600 MHz Band Plan	)	GN Docket No. 12-268

COMMENTS OF CTIA – THE WIRELESS ASSOCIATION®

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I. INTRODUCTION AND SUMMARY

CTIA – The Wireless Association® ("CTIA")[1] hereby submits these comments in response to the Public Notice released by the Wireless Telecommunications Bureau (the "WTB" or "Bureau") seeking comment on issues related to the proposed 600 MHz band plan.[2] As CTIA and several others have observed over the course of this proceeding, a well-reasoned band plan is essential for the proposed incentive auction to achieve the critical goal of unleashing necessary additional spectrum for mobile broadband.[3] Since the Commission originally sought comment

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[1] CTIA—The Wireless Association is not a typographical error. *City of Arlington v. FCC*, 569 U.S. ___, ___ (2013)(slip op. at 3, n.1). More properly, CTIA is an orphan initialism. CTIA was founded in 1984 as the Cellular Telecommunications Industry Association. In 2000, CTIA merged with the Wireless Data Forum and became the Cellular Telecommunications & Internet Association. In 2004, we changed our name to CTIA-The Wireless Association®. This name better represents CTIA's diverse membership of service providers, manufacturers, wireless data and Internet companies, as well as other contributors to the wireless universe. More information about CTIA is available on the Association's website at http://www.ctia.org/aboutCTIA/.

[2] Wireless Telecommunications Bureau Seeks to Supplement the Record on the 600 MHz Band Plan, Public Notice, GN Docket No. 12-268 (May 17, 2013) ("Public Notice").

[3] *See, e.g.*, Reply Comments of CTIA – The Wireless Association®, GN Docket No. 12-268, at 14 (Mar. 12, 2013) ("CTIA NPRM Reply Comments"); Comments of AT&T Inc., GN Docket No. 12-268, at 14 (Jan. 25, 2013 ("AT&T NPRM Comments") ("This auction can succeed only if the Commission's band plan is sound."); Comments of Nokia Siemens Networks US LLC, GN Docket No. 12-268, at 7 (Jan. 25, 2013) ("Nokia Siemens Networks NPRM Comments") ("The statutory structure of the incentive auction as a one-time opportunity amplifies the importance of it being a success"); Comments of QUALCOMM Incorporated, GN

on incentive auction issues, there has been growing consensus among wireless and broadcast industry stakeholders on the framework regarding the ideal 600 MHz band plan. CTIA urges the Commission to carefully consider the band plan principles endorsed by numerous key stakeholders, including CTIA. Such action is particularly important because, as discussed herein, the "Down from 51"[4] band plan variants proposed in the Public Notice present significant technical and policy challenges.

II. NUMEROUS TRADE ASSOCIATIONS, CARRIERS, MANUFACTURERS, AND BROADCASTERS HAVE AGREED TO A FRAMEWORK FOR A 600 MHZ BAND PLAN

In the nine months since the Commission released its Notice of Proposed Rulemaking ("*Incentive Auction NPRM*") on proposed rules for the broadcast incentive auction, issues related to 600 MHz band plans have been intensely discussed and debated, with consensus on a framework steadily growing. The Commission should move ahead with a band plan with these fundamental elements at the core. Confidence by stakeholders in the Commission's ultimate decision is essential, as the Commission and Congress have hailed the incentive auction process

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Docket No. 12-268, at 1 (Jan. 25, 2013) ("QUALCOMM NPRM Comments") ("For this proceeding to be successful, the FCC must develop rules and a band plan that provides as much clarity and certainty as possible to current broadcast licensees and to future flexible use licensees . . . to encourage the highest levels of participation from both groups and for the agency and America to reap the greatest value.").

[4] CTIA recognizes that several parties to this proceeding have made varying band plan proposals that they have referred to as "Down from 51" band plans. By using the expression "Down from 51" in these Comments, CTIA is not endorsing any specific band plan proposal submitted to the Commission. Rather, CTIA uses this terminology to refer to any band plan that meets the criteria described in paragraph 178 of the *Incentive Auction NPRM*. *See Incentive Auction NPRM* at ¶ 178 ("Using an alternative approach to our lead band plan proposal, we could clear broadcast television channels starting at channel 51 and expand downward. As illustrated in Figure 12, we would organize the cleared spectrum into an uplink portion, a downlink portion, and any necessary guard bands. Adopting this alternative would require us to designate a quantity of spectrum as a duplex gap between the uplink and downlink bands, which would not be used for licensed wireless broadband operations.").

as vital to the future of wireless broadband. For the incentive auction to be a success, the Commission's goal should be to thoroughly investigate the findings of key technical stakeholders and move forward with a band plan that has the approval of the majority of interested parties.

In their comments filed in response to the Commission's *Incentive Auction NPRM*, key stakeholders from both the wireless and broadcast industries agreed on several essential characteristics that a successful 600 MHz band plan must possess. At that time, these stakeholders also were nearly unanimous in their disapproval of the initial band plan proffered by the Commission.[5] Meanwhile, and as Commissioner Pai correctly noted in his statement regarding the Public Notice, broadcasters, major wireless carriers, and prominent equipment manufacturers submitted to the Commission a cooperative joint accord on what they agreed to be essential band plan components, demonstrating a level of consensus and cooperation that Commissioner Pai hailed as "a particularly remarkable development."[6] Moving forward with this framework will allow the Commission to honor Commissioner Rosenworcel's call to have a 600 MHz band plan in place by the end of the third quarter of 2013.[7]

Since the comment period closed on the *Incentive Auction NPRM*, consensus among technical experts has continued to grow. As outlined below, CTIA has highlighted five key principles that a successful band plan should possess. First, CTIA stated that the Commission should focus on pairing as much spectrum as possible above TV Channel 37, a concept

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[5] CTIA NPRM Reply Comments at 28-29, n. 99 (outlining the record opposition to the Commission's proposed "split" band plan).

[6] Statement of Commissioner Ajit Pai on the Public Notice of the Wireless Telecommunications Bureau to Supplement the Record on the 600 MHz Band Plan, News Release, GN Docket No. 12-268, at 1 (May 17, 2013).

[7] Remarks of Commissioner Jessica Rosenworcel, CTIA 2013 – The Mobile Marketplace, Las Vegas, NV at 2 (May 22, 2013).

supported by companies such as Nokia Siemens Networks, Qualcomm, T-Mobile, and Verizon.[8] Second, CTIA – along with others such as BlackBerry, C Spire, Leap, MetroPCS, Motorola Mobility, T-Mobile, and Verizon[9] – supported licensing the 600 MHz band in 5 MHz "building blocks" to accommodate next-generation technologies, as well as the business needs of large and small carriers. Third, stakeholders such as AT&T, the Competitive Carriers Association, MetroPCS, Motorola Mobility, and T-Mobile have asked the Commission to create a band plan that makes every effort to deliver a consistent baseline of nationwide downlink bandwidth for paired spectrum.[10] Fourth, the Commission should adopt a band plan that includes interference-preventing guard bands that can accommodate qualifying unlicensed operations, as described in greater detail, for example, by Alcatel-Lucent, AT&T, BlackBerry, Motorola Mobility, and T-Mobile.[11] Fifth, and finally, several stakeholders – including Alcatel-Lucent, AT&T, Nokia

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8 *See, e.g.*, Nokia Siemens Networks NPRM Comments at 17; QUALCOMM NPRM Comments at 4; Comments of T-Mobile USA, Inc., GN Docket No. 12-268, at 10 (Jan. 25, 2013) ("T-Mobile NPRM Comments"); Comments of Verizon and Verizon Wireless, GN Docket No. 12-268, at v (Jan. 25, 2013 ("Verizon Wireless NPRM Comments").

9 *See, e.g.*, Comments of Cellular South, Inc., GN Docket No. 12-268, at 6 (Jan. 25, 2013) ("C Spire NPRM Comments"); Comments of Research in Motion, GN Docket No. 12-268, at 6 (Jan. 25, 2013) ("RIM NPRM Comments"); Comments of Leap Wireless International, Inc., and Cricket Communications, Inc., GN Docket No. 12-268, at 5 (Jan. 25, 2013) ("Leap NPRM Comments"); Comments of MetroPCS Communications, Inc., GN Docket No. 12-268, at 20 (Jan. 25, 2013) ("MetroPCS NPRM Comments"); Comments of Motorola Mobility LLC, GN Docket No. 12-268, at 13 (Jan. 25, 2013) ("Motorola Mobility NPRM Comments"); T-Mobile NPRM Comments at 14-15; Verizon Wireless NPRM Comments at 16.

10 *See, e.g.*, AT&T NPRM Comments at 15; Comments of the Competitive Carriers Association, GN Docket No. 12-268, at 12 (Jan. 25, 2013) ("CCA NPRM Comments"); MetroPCS NPRM Comments at 21; Motorola Mobility NPRM Comments at 10; T-Mobile NPRM Comments at 6.

11 *See, e.g.*, Alcatel-Lucent NPRM Comments at 22-23; AT&T NPRM Comments at 4-5; RIM NPRM Comments at 11; Motorola Mobility NPRM Comments at 12-13; T-Mobile NPRM Comments at 13.

Siemens Networks, Qualcomm, T-Mobile, and Verizon – support a consistent duplex gap of 10 MHz or more in any band plan based on frequency division duplex ("FDD") technology.[12]

Last month, the Commission hosted a public workshop which gathered key stakeholders and technical experts representing large and small wireless carriers, equipment manufacturers, broadcasters, and TV Channel 37 users. This workshop, which covered a variety of issues governing the 600 MHz band plan process, addressed key technical issues and demonstrated that there is widespread agreement regarding particular fundamental elements of the 600 MHz band plan.

III. THE RECORD IN THIS PROCEEDING HAS REVEALED CERTAIN ESSENTIAL COMPONENTS OF A SUCCESSFUL BAND PLAN, AND THE COMMISSION SHOULD STRIVE TOWARD A BAND PLAN THAT INCORPORATES THESE PRINCIPLES

As CTIA has previously noted, the record has shown that CTIA, together with a significant number of carriers, manufacturers, and broadcasters, have united in support of several essential components of a successful 600 MHz band plan. As the Commission has acknowledged, creating a band plan from relinquished broadcast television spectrum "presents unique challenges."[13] It is essential that the Commission rise to these challenges, because as Qualcomm has observed, "[f]or this proceeding to be successful, the FCC must develop rules and a band plan that provides as much clarity and certainty as possible to current broadcast licensees

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[12] *See, e.g.*, Alcatel-Lucent NPRM Comments at 21; AT&T NPRM Comments at 34; Nokia Siemens Networks NPRM Comments at 9; QUALCOMM NPRM Comments at ii; T-Mobile NPRM Comments at 11; Verizon Wireless NPRM Comments at 18-19.

[13] *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, FCC 12-118 ¶ 123 (Sept. 28, 2012) ("*Incentive Auction NPRM*").

and to future flexible use licensees . . . to encourage the highest levels of participation from both groups and for the agency and America to reap the greatest value."[14]

There are several key components that should drive the Commission's thinking as it develops a band plan. First, the Commission should focus on pairing as much spectrum as possible above TV Channel 37. CTIA continues to support the National Broadband Plan's objective of reallocating 120 MHz of broadcast television spectrum to wireless operations and believes the FCC must continue all efforts to obtain as much new wireless broadband spectrum as possible through the incentive auction process. However, CTIA recognizes that the amount of spectrum to be repurposed in the auction is unknown and could vary by market. Additionally, the Commission should focus its efforts on allocating spectrum above TV Channel 37 as the most critical spectrum for reallocation. CTIA is pleased that the Bureau's Public Notice seems focused on variants of the "Down from 51"[15] proposal for the 600 MHz spectrum rather than prior proposals to use Channel 37 to separate uplink and downlink. By selecting a "Down from 51" approach, the FCC will be best positioned to maximize paired, licensed spectrum above TV 37.

Second, the Commission should license the 600 MHz band in 5 MHz "building blocks." The record developed in response to the *Incentive Auction NPRM* contained overwhelming support for this proposal.[16] Supporters of this method note that by using 5 MHz building blocks

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14 QUALCOMM NPRM Comments at 1.

15 *See* Footnote 4, *supra.*

16 Comments of Leap Wireless International, Inc., and Cricket Communications, Inc., GN Docket No. 12-268, at 5 (Jan. 25, 2013) ("Leap NPRM Comments"); Comments of MetroPCS Communications, Inc., GN Docket No. 12-268, at 20 (Jan. 25, 2013) ("MetroPCS NPRM Comments"); QUALCOMM NPRM Comments at n. 12; T-Mobile NPRM Comments at 14-15; Verizon Wireless NPRM Comments at 15-16; C Spire NPRM Comments at 6.

instead of 6 MHz building blocks (as in the 700 MHz band), the Commission can potentially reallocate six licenses for every 30 MHz of reclaimed spectrum, as opposed to five. This structure will also help support wireless broadband technologies such as Wideband-Code Division Multiple Access ("W-CDMA"), High Speed Packet Access ("HSPA"), and LTE (when 5 MHz blocks are aggregated to form 2 x 10 MHz blocks).[17] This framework also will maximize flexibility for potential bidders of all sizes. However, CTIA stresses that if the Commission is to auction "generic" rather than specific blocks of spectrum, these licenses must be truly fungible, and no bidder should find themselves unexpectedly holding a license that is much less valuable than what the bidder anticipated.

Third, the Commission must create a band plan that makes every effort to deliver a consistent baseline of nationwide downlink[18] bandwidth for paired spectrum. This will facilitate the design of innovative and consumer-friendly devices. CTIA recognizes that the amount of spectrum cleared may vary by market, but believes that, in a paired configuration, variable amounts of uplink spectrum will be easier to manage than varying amounts of downlink spectrum. The Commission correctly observed that "by keeping the downlink spectrum consistent nationwide, we can help ensure as a technical matter that wireless providers will be able to offer mobile devices that can operate across the country, which should minimize design cost and interoperability concerns, and allow for greater economies of scale."[19] Should there be

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[17] Comments of Motorola Mobility LLC, GN Docket No. 12-268, at 13 (Jan. 25, 2013) ("Motorola Mobility NPRM Comments"). *See also* MetroPCS NPRM Comments at 20 ("Additionally, the current advanced wireless standard – long-term evolution ("LTE") – is not configured for use in 6 MHz blocks, but rather 5 MHz blocks.").

[18] In this context, CTIA is specifically referring to that downlink spectrum that would be paired with uplink spectrum as part of a FDD-based 600 MHz band plan.

[19] *Incentive Auction NPRM* at ¶ 124.

market-by-market variation in downlink spectrum, equipment manufacturers will need to add multiple filters to their devices, with corresponding increases in cost and handset size. For this reason, variation in downlink spectrum is something to be avoided to the extent possible.

Fourth, the Commission should adopt a band plan that includes interference-preventing guard bands that can serve as a home to qualifying unlicensed operations. Certain guard bands, such as a guard band between 600 MHz downlink and television operations, are necessary to the prevention of interference between different services. However, it is clear from the language of the Spectrum Act that Congress intended for the Commission to exercise restraint in establishing guard bands, and that these guard bands may only be as large as is technically reasonable to prevent interference. To that end, unlicensed operations should be permitted in the guard bands as long as they do not cause harmful interference to licensed wireless services.

Fifth, and finally, any band plan based on FDD technology would require a duplex gap of 10 MHz or more. "[D]edicating sufficient spectrum to the duplex gap is critical to device design,"[20] but the duplex gap must be appropriately-sized. Commenters generally agree that the duplex gap must be 10 MHz or more, with most commenters supporting a duplex gap between 10 and 14 MHz.[21] They also note that a duplex gap of this size would be sufficient to prevent harmful interference and ideal from a device design perspective.

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[20] Verizon Wireless NPRM Comments at 18-19.

[21] Comments of Alcatel-Lucent, GN Docket No. 12-268, at 21 (Jan. 25, 2013) ("Alcatel-Lucent NPRM Comments") (supporting a duplex gap of 10-12 MHz); AT&T NPRM Comments at 34 ("The size of an ideal duplex gap would likely range from ten to fourteen megahertz, depending on a number of factors that AT&T continues to analyze in conjunction with other industry participants."); Nokia Siemens Networks NPRM Comments at 9 (supporting a duplex gap of at least 10 MHz); QUALCOMM NPRM Comments at ii (stating that it is most confident about a band plan with a 10 to 14 MHz duplex gap); T-Mobile NPRM Comments at 11 (supporting a 10 MHz duplex gap but noting that it could be increased to 14 MHz if interference concerns so suggest).

By adopting a band plan consistent with these five principles, the Commission will develop a framework for wireless broadband operations in the 600 MHz band that will inspire confidence from the wireless industry and the support of the broadcast industry. This will lead to a productive incentive auction and the furtherance of the Commission's and Congress' policy objectives.

IV. THE RECORD DEMONSTRATES SIGNIFICANT TECHNICAL AND POLICY CHALLENGES ASSOCIATED WITH EACH OF THE BUREAU'S PROPOSED "DOWN FROM 51" BAND PLAN VARIANTS

In the Public Notice, the Bureau noted the widespread support for a "Down from 51" band plan and sought comment on certain variations of this band plan concept.[22] While the band plans proffered by the Bureau in the Public Notice were not initially introduced in the *Incentive Auction NPRM,* commenters have previously demonstrated key flaws in the basic assumptions of these alternative band plans. CTIA articulates these concerns in more detail below.

A. The "Down from 51 Reversed" Band Plan Variation Has Been Considered and Dismissed by Several Companies as a Less Beneficial Band Plan.

As indicated in the Public Notice, a "Down from 51 Reversed" band plan would involve the clearing of broadcast television channels starting at Channel 51 and expanding downward.[23] The downlink band would begin after a guard band at Channel 51, followed by a duplex gap, and finally the uplink band. CTIA opposes this band for two reasons: (1) the frequencies adjacent to Channel 51 are much better suited for uplink spectrum, not downlink, and (2) this band plan would limit the amount of new, licensed spectrum made available by requiring an additional guard band that would not be necessary under a traditional "Down from 51" plan.

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22 *See* Public Notice.

23 *Id.* at 3.

As an initial matter, CTIA opposes the "Down from 51 Reversed" band plan because it fails to capitalize on the technical characteristics of the upper portion of the UHF band that make this spectrum ideally suited to support uplink operations. Qualcomm, for example, analyzed the signal harmonics and intermodulation distortion generated by 600 MHz transmitters and concluded that the uppermost 25 MHz of the UHF would be best suited for mobile uplinks because harmonics in this band would be least likely to impact other services.[24] This spectrum is also less likely to result in intermodulation distortion.

Qualcomm is not the only party to reach the conclusion that the upper portion of the UHF band is best suited for uplink. Indeed, manufacturers and wireless providers that support at "Down from 51" approach uniformly have mobile uplinks adjacent to the Lower 700 MHz A Block mobile uplink band.[25] CTIA cannot find a single party in the record that supported the idea of placing mobile downlinks in spectrum adjacent to mobile uplinks as suggested in the "Down from 51 Reversed" proposal due to the significant interference issues associated with dissimilar wireless operations in adjacent spectrum as well as the inefficiencies (extra guard band requirements) associated with this plan.

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[24] QUALCOMM NPRM Comments at 7-12.

[25] *See, e.g.*, T-Mobile NPRM Comments at 10 (proposing a thirty-five megahertz uplink allocation at 663-698 MHz); Reply Comments of Intel Corporation, GN Docket No. 12-268, at 5 (Mar. 12, 2013); Alcatel-Lucent NPRM Comments at 13 ("Alcatel-Lucent agrees with the Commission that, in an FDD-based band plan, the first wireless uplink spectrum segment should be allocated from TV channel 51 down in 5 MHz blocks."); Reply Comments of Ericsson, GN Docket No. 12-268, at 17 (Mar. 12, 2013) ("Adopt a band plan that reallocates a contiguous band of spectrum from Channel 51 downwards, with the uplink located at the top for compatibility with 700 MHz usage."); Verizon Wireless NPRM Comments at 14 ("The *NPRM* correctly proposes to locate paired uplink spectrum adjacent to the 700 MHz band. That location avoids wasting spectrum because there is no need for a guard band between the Lower 700 MHz band and the 600 MHz band. Moreover, the uplink band should be limited to 35 MHz wide and confined to Channels 46 to 51 to avoid the uplink harmonics problem discussed above").

Moreover, this conclusion was bolstered by the expert presentations at the recent FCC band plan workshop. For example, Darryl DeGruy of U.S. Cellular observed that a reversed band plan would be problematic because "the base station receiver would be direct line-of-sight to potentially TV broadcasters because antennas on base stations are typically high in the air and so that receiver doesn't have the benefit of clutter being lower on the ground, buildings, trees to block the signal, et cetera."[26]

Further, and as the Bureau stated in the Public Notice, the "Down from 51 Reversed" band plan would necessitate an additional guard band between the Lower 700 MHz A Block uplink spectrum and the downlink spectrum at the top of the 600 MHz band. While such a guard band would be technically necessary under the "Down from 51 Reversed" plan, CTIA notes that this band plan would create an additional guard band that would not be needed under the alternative approach supported by major wireless carriers and the NAB. Given the grave spectrum crunch facing the wireless ecosystem and the urgent need for additional licensed spectrum, CTIA cannot support a band plan that would unnecessarily limit the amount of licensed spectrum made available.[27]

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[26] Transcript of LEARN Workshop – 600 MHz Band Plan, GN Docket No. 12-268, at 275-276 (May 3, 2013, posted June 5, 2013) ("Band Plan Workshop Transcript").

[27] CTIA agrees with the Commission that placing uplink and downlink operations in adjacent spectrum would result in significant harmful interference to the operations in this spectrum. Further, the wireless industry has made clear the need to protect the A Block from harmful interference caused by operations on TV Channel 51. Regardless of the band plan adopted in this proceeding, CTIA strongly supports any effort to ensure that Channel 51 is cleared so as to facilitate 700 MHz A Block use and that the Channel 51 mistake is not repeated in the 600 MHz band.

B. The "Down from 51" Band Plan with Broadcast Operations in the Duplex Gap in Constrained Markets Would Very Likely Cause Significant Interference and Should be Disregarded.

The Commission has also proposed a "Down from 51" band plan where, in spectrum-constrained markets, full-power television stations would be permitted to operate in the duplex gap.[28] In particular, the Commission asks whether the technical problems associated with such operations would be mitigated by the fact that this would only occur in certain markets.[29] In proposing this band plan, the Commission has misunderstood the proposals of wireless carriers regarding television operations in the duplex gap. Indeed, numerous parties have previously highlighted the significant interference threat that would be posed by this configuration.

1. The industry "Down from 51" band plans rely upon use of the uplink pass band in variable spectrum markets, not TV operations in the duplex gap.

CTIA believes that the Commission has mistaken parties' acknowledgment of potential market variability for an endorsement of television stations in the duplex gap. Specifically, the Commission points to a filing by T-Mobile in support of its finding that television stations could be placed in the duplex gap in constrained markets.[30] CTIA has provided two examples from the T-Mobile filing below:

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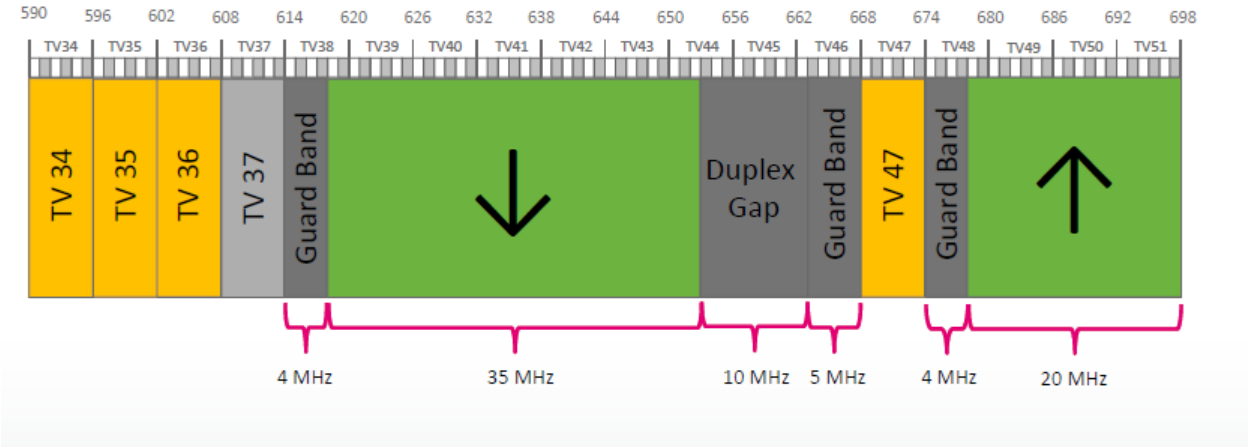
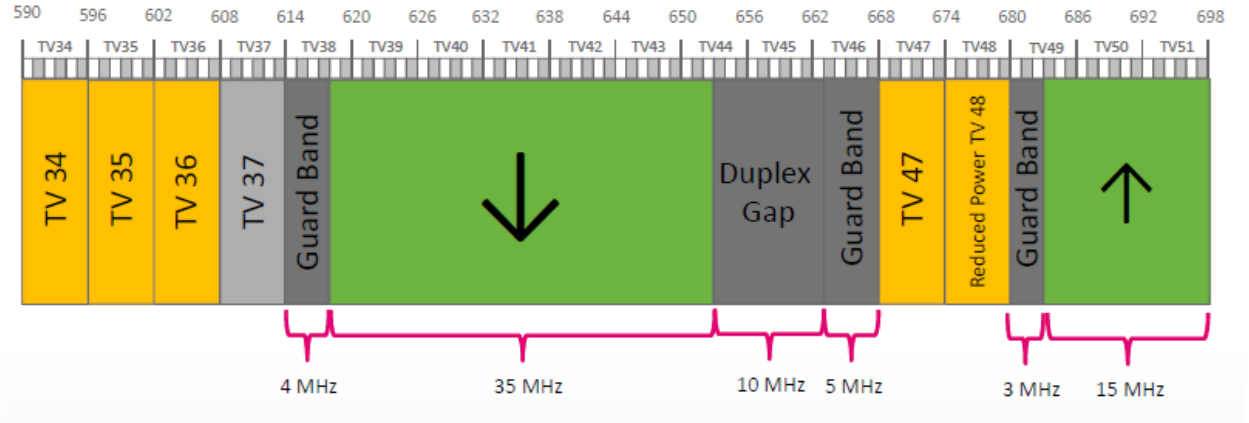
28 Public Notice at 5.

29 *Id.*

30 *Id.* at n. 25.





The FCC appears to believe that the TV 47 and TV 48 operations shown in these figures are indicative of TV operations within the duplex gap. However, as can be seen above, the duplex gap is clearly specified as being in the 653 to 663 MHz band in both figures. In none of the representative band plans provided by T-Mobile are there TV operations in the actual duplex gap, but instead (in cases where various amounts of spectrum are cleared) there is a suggestion that some TV operations could be allowed in the mobile uplink pass band, not the duplex gap. What some parties have observed is that "[i]n markets with very low clearing, it may be possible to allow TV stations in the *uplink or downlink pass bands*."[31] For example, as depicted in the

[31] Verizon Wireless NPRM Comments at 19 (emphasis added).

figures above, the T-Mobile proposal cited by the Commission maintains a fixed 10 MHz duplex gap but provides for broadcast operations in the uplink pass band in those markets where 13 or fewer channels are cleared.[32] Such an approach would be similar to the Commission's concept of band plan "families" in which differential receive filtering would be enabled in the base station to accommodate variations in the amount of uplink spectrum.[33] Qualcomm describes this approach containing TV stations entirely within the uplink band-- "provid[ing] strong attenuation of the TV signal from the duplexer's downlink band filter and offer protection of the downlink receive path,"[34] a far preferable outcome to the interference scenario with television in the duplex gap. Qualcomm notes that this "sub-optimal approach"[35] should be avoided because such an approach "creates additional guard bands and buffer zones that may extend into adjacent markets."[36]

However, no members of the wireless industry (or the broadcast industry, for that matter) suggested that TV operations remain in the duplex gap in constrained markets. Rather, each proposed "Down from 51" band plan provided to the Commission would have a fixed duplex

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32 Letter from Trey Hanbury, Counsel to T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, attachment at 14-17 (Feb. 1, 2013) ("T-Mobile Band Plan Ex Parte").

33 *Incentive Auction NPRM* at ¶ 138. *See also* Band Plan Workshop Transcript at 277 ("And so individual base stations in a market that are only using a portion of the uplink spectrum can be filtered to see only that part and thus filter out the adjacent TV stations that might be in-band to, you know, the rest of the band.").

34 QUALCOMM NPRM Comments at 19.

35 *Id.*

36 Verizon Wireless NPRM Comments at 19. Indeed, the T-Mobile *ex parte* presentation cited to by the Commission illustrates the drawbacks of this approach. If the Commission permits TV operations in the uplink pass band of a particularly constrained market, additional guard bands will be required on either side of these TV stations, and these television operations could cause challenges in adjacent markets. T-Mobile Band Plan Ex Parte at 16.

gap. From that starting point, the downlink spectrum is built out. The issue that remains is the co-channel interference protection between markets with varied amounts of spectrum, not the use of the duplex gap for TV operations as well as the amount of guard bands needed to protect wireless operations from harmful TV interference (as is shown in the first figure above for the T-Mobile band plan where there are guard bands needed surrounding TV 47).

Therefore, for the " Down from 51" approach favored by the wireless industry, market variability in spectrum made available can be handled by allowing limited use of the uplink (or downlink) pass band for TV station operations. However, this outcome should not be the normal operating environment; it should only be used in the cases where the Commission is unable to clear sufficient spectrum for efficient pairing of the reallocated TV spectrum. As noted in the T-Mobile figures above, use of the uplink (or downlink) pass band in this fashion will require additional guard bands in those unusual markets as well as "buffer zones" between markets that may have TV operations and those that have wireless operations in the same spectrum bands.

2. The Commission must not allow use of the duplex gap for TV operations due to harmful intermodulation interference effects.

Presuming the Commission is still considering allowing TV operations within the duplex gap; numerous parties have previously outlined the significant interference threat that would be posed by this configuration. With respect to wireless, allowing broadcast television in the duplex gap would enable a source of intermodulation products that would fall into the downlink receive band and interfere with wireless broadband services. Motorola Mobility noted that by permitting television stations in the duplex gap, the Commission would enable "a source of intermodulation products" that would "fall into the downlink receive band and therefore interfere with wireless broadband devices."[37] In other words, "a device's *uplink* transmissions, when mixed with

[37] Motorola Mobility NPRM Comments at 10.

broadcast signals, will create interference on the same device's *downlink* frequencies."[38] Verizon has argued that TV operations not be permitted in the duplex gap because "the duplexer would not be able to provide sufficient attenuation and intermodulation interference would be generated by interactions between 600 MHz uplink transmission and DTV transmissions within the duplex gap."[39] With respect to broadcast, NAB also observed that dividing the UHF spectrum into separate blocks with high-power broadcast operations interspersed with mobile wireless would both degrade the performance of current DTV receivers and increase the complexity and cost of new ones.[40] Given the myriad interference challenges, CTIA does not support the suggestion made by the Commission of TV operations remaining in the wireless duplex gap, and urges the Commission to instead maintain a fixed, static duplex gap that plays host only to lower-power unlicensed operations.

V. CONCLUSION

CTIA appreciates the Commission's recognition of the complexity associated with the 600 MHz band plan. This is an extremely important issue that will be critical to the incentive auction's success, and CTIA applauds the various technical experts in this proceeding for their close consideration of technical issues. CTIA notes the growing consensus of a framework that the Commission should use to move forward, and urges the Commission to adopt a band plan.

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38 AT&T NPRM Comments at 25.

39 Verizon Wireless NPRM Comments at 19.

40 Comments of the National Association of Broadcasters, GN Docket No. 12-268 at 34-35 (Jan. 25, 2013) ("NAB NPRM Comments").

Respectfully submitted,

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